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AUTHOR	Gordon, Marjorie S.
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ABSTRACT

This is one of two guidebooks designed for the highly motivated student in grade seven. Decimals, ratio and proportion, and percent are covered. Overall goals for the course are specified, then performance objectives, a unit outline, references, and teaching suggestions are given for each unit. A sample posttest and a list of references are included. (DT)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

DADE COUNTY PUBLIC SCHOOLS

MATH STRUCTURES 2

5211.22

MATHEMATICS

DIVISION OF INSTRUCTION • 1971

ED 067293

QUINMESTER MATHEMATICS

COURSE OF STUDY

FOR

MATH STRUCTURES 2
5211.22

(EXPERIMENTAL)

Written by

Marjorie S. Gordon

for the

DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, Florida 33132
1971-72

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PREFACE

The following course of study has been designed to set a minimum standard for student performance after exposure to the material described and to specify sources which can be the basis for the planning of daily activities by the teacher. There has been no attempt to prescribe teaching strategies; those strategies listed are merely suggestions which have proved successful at some time for some class.

The course sequence is suggested as a guide; an individual teacher should feel free to rearrange the sequence whenever other alternatives seem more desirable. Since the course content represents a minimum, a teacher should feel free to add to the content specified.

Any comments and/or suggestions which will help to improve the existing curriculum will be appreciated. Please direct your remarks to the Consultant for Mathematics.

All courses of study have been edited by a subcommittee of the Mathematics Advisory Committee.

CATALOGUE DESCRIPTION

This is one of two quins recommended in Grade 7 in order to build fundamental concepts for success in Algebra. Includes decimals, ratio and proportion, per cent, and problem solving.

Designed for the highly motivated student in grade 7.

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OVERALL GOALS

1. To improve the student's skills with decimals.

2. To develop the student's understanding of ratio, proportion and per cent.

3. To enable the student to solve verbal problems, involving per cent, using the proportion method.

KEY TO REFERENCES
(*State Adopted)

K (1) Keedy, Mervin; Jameson, Richard; and Johnson, Patricia. Exploring Modern Mathematics, Book 1. New York: Holt, Rinehart and Winston, Inc., 1963.

Mc (7) McSwain, E. T.; Brown, K. W.; Gundlach, B. H.; and Cooke, R. J. Mathematics 7. River Forest, Illinois: Laidlaw Brothers, 1965.

SMS (1) Suppes, Patrick; Meserve, Bruce; Sears, Phyllis. Sets, Numbers, and Systems, Book 1. New York: The L. W. Singer Co., 1969.

PERFORMANCE OBJECTIVES

The student will:

1. Locate the point on a number line that corresponds to a given decimal.
2. Write a verbal expression for a given decimal.
3. Write a decimal for a given verbal expression.
4. Write a decimal in expanded notation.
5. Add, subtract, multiply and divide decimals.
6. Determine the decimal that is equivalent to a given fraction.
7. Determine the fraction, in lowest terms, that is equivalent to a given decimal.
8. Determine whether a given fraction is equivalent to a repeating or a terminating decimal by inspection of the denominator.

COURSE OUTLINE

I. Decimals

- A. Understanding
  - 1. graphing on a number line
  - 2. reading
  - 3. writing
  - 4. expanding
- B. Operations
  - 1. adding
  - 2. subtracting
  - 3. multiplying
  - 4. dividing
- C. Equivalent forms
  - 1. decimal to fraction
  - 2. fraction to decimal
    - a. terminating decimal
    - b. repeating decimal
    - c. predicting which kind of decimal

REFERENCES

K (1) Chapter 6, P. 261-281. P. 262 practice writing in expanded form.
P. 265, 266, 269, 271-275 practice in computation.
P. 277 algebraic approach to changing a repeating decimal to a fraction.

Mc (7) Chapter 7, P. 125-141 additional practice problems
P. 346-349 many good problems on these pages for drill.

SMS (1) Chapter 3, P. 53-61. P. 53 comparing decimals.
P. 54-60 computation and verbal problems
P. 61 repeating decimals

SUGGESTED STRATEGIES

1. Use money and the metric system as practical applications of decimals.

2. Practice prime factoring of denominator to predict whether decimal will terminate or repeat and investigate why this is always true. Perhaps a proof could be developed.

3. Practice problem solving using decimals.

ADDITIONAL REFERENCES

Gundlach, B.; Buffie, E.; Denny, R.; Kempf, A. Junior High School Mathematics 7. River Forest, Illinois: Laidlow Brothers, 1968.

PERFORMANCE OBJECTIVES

The student will:

1. Define a ratio and give an example.
2. Determine when two ratios are equal.
3. Define a proportion.
4. Solve a given proportion for the unknown number.
5. Solve selected word problems by setting up a proportion and then solving.

COURSE OUTLINE

II. Ratio and Proportion

- A. Ratio
  - 1. definition
  - 2. test for equality
- B. Proportion
  - 1. definition
  - 2. solving for an unknown
- C. Applications
  - 1. setting up problems
  - 2. solving word problems

REFERENCES

K (1) Ratio defined P. 405-406. Nothing on proportion or solving word problems by this method.

Mc (7) Chapter 10, P. 191-206. Develops ratio and proportion and leads into equations and problem solving. Good exercises on P. 194 and P. 198.

SMS (1) Chapter 11, P. 218-224. Introduces ratio, proportion, and gives several verbal problems. This leads into per cent and solving by proportion method.

SUGGESTED STRATEGIES

1. Work on setting up proportions and equations before applying it to word problems.

ADDITIONAL REFERENCES

Halliday, Helen; Weiss, Bertha; Newman, Miriam; Goode, Charles. Contemporary Mathematics. New York: William H. Sadlier, Inc., 1968. P. 250-266 good practice with ratios.

Dolciani, Mary; Wooton, William; Beckenbach, Edwin; Chinn, William. Modern School Mathematics. 7. Boston : Houghton Mifflin Company, 1967.

PERFORMANCE OBJECTIVES

The student will:

1. Define per cent and give an example.
2. Express a per cent as a ratio.
3. Determine the decimal that is equivalent to a given per cent.
4. Determine the simplest fraction that is equivalent to a given per cent.
5. Determine the per cent that is equivalent to a given fraction.
6. Determine the per cent that is equivalent to a given decimal.
7. Solve the three types of per cent problems using proportion.
8. Solve per cent problems using the formula rb=p.
9. Solve word problems involving per cent including such types as commission, discount, per cent increase, per cent decrease, and interest.

COURSE OUTLINE

III. Per Cent

- A. Definition
- B. Equivalent forms
  - 1. per cent to decimal
  - 2. per cent to fraction
  - 3. fraction to per cent
  - 4. decimal to per cent
- C. Problem Solving
  - 1. using proportion
    - a. finding the percentage
    - b. finding the rate
    - c. finding the base
  - 2. using the formula rb=p

COURSE OUTLINE

D. Applications
   1. General
   2. Interest
   3. Commission
   4. Discount
   5. Percent
   6. Installment buying

REFERENCES

K (1) Chapter 6, P. 278-281. very little per cent. No ratio and proportion and no word problems.

Mc (7) Chapter 11, P. 207-222. Chapter 11 develops per cent which uses ratio-proportion approach.

SMS (1) P. 224-232. per cent presented as a ratio. Several word problems for practice.

STRATEGIES

Per cent is difficult for the 7th grade student and much supplementary material will be needed. Use of a hundred board is good to show per cents less than one through 99 visually. Newspaper and magazines help in showing practical uses of per cent. Discussions of banks, installment buying, down payments are good to stimulate interest. Extra credit assignments on these topics are good. There is a good unit on ratio-proportion and per cent, available through the county office, written as a supplement to Keedy 7.

ADDITIONAL REFERENCES

Dolciani, Mary; Wooton, William; Beckenbach, Edwin; Chinn, William. Modern School Mathematics, 7. Boston: Houghton Mifflin Company, 1967.

Gundlach, B.; Buffie, E.; Denny, R.; Kempf, A. Junior High School Mathematics 7. River Forest, Illinois: Laidlaw Brothers, 1968.

Nichols, Eugene; Flournoy, Frances; Kalin, Robert; Simon, Leonard. Elementary Mathematics 7. New York: Holt, Rinehart and Winston, Inc., 1966. P. 77-101, good development or the ratio-proportion method.

SAMPLE POSTTEST

Selected items may also be used as a pre-test.

I. 1. Place the following on the number line below:

a. 6.1 b. 0.9 c. .23

2. Write in words:

a. 0.3 b. .02 c. 5.23 d. 27.001

3. Write using symbols.

a. Three hundredths
b. Five and nine tenths
c. Six and eight ten-thousandths

4. Write in expanded form.

a. .67 b. 3.21 c. 58.34

5. Computation.

Add:

a. 6.2
9.45
18.96

b. 2.1 + .003 + 96 + 7.24

Subtract:

c. 6.24
.98

d. 3.4
.986

e. From 92.1 take 6.734.

Multiply:

f. $\begin{array}{r} 9.2 \\ \times\ .04 \\ \hline \end{array}$ g. $\begin{array}{r} .67 \\ \times\ .43 \\ \hline \end{array}$ h. $\begin{array}{r} 76.4 \\ \times\ .0002 \\ \hline \end{array}$

Divide:

i. $.04\overline{)1.6}$ j. $.25\overline{)375}$ k. $15\overline{).075}$

l. $8\overline{)7}$

6. Change to a decimal:

a. $\frac{2}{5}$ b. $\frac{3}{40}$ c. $\frac{2}{7}$

7. Change to fractions in lowest terms:

a. .7 b. .64 c. 2.24

8. Tell whether the equivalent decimal is repeating or terminating:

a. $\frac{5}{6}$ b. $\frac{7}{8}$ c. $\frac{4}{75}$ d. $\frac{7}{200}$

II. 1. Define a ratio and give an example of a ratio.

2. Tell whether the following are equal or not equal (use = or $\neq$):

a. $\frac{2}{3}$ $\frac{6}{7}$ b. $\frac{7}{10}$ $\frac{4}{5}$ c. $\frac{9}{3}$ $\frac{21}{7}$

3. Define what we mean by a proportion.

4. Solve for the unknown member:

a. $\frac{3}{4} = \frac{C}{9}$ b. $\frac{2}{B} = \frac{7}{8}$

5. Write a proportion for the following problems, then solve. Check work.

a. If a picture measures 3 in. by 5 in. and it is enlarged, what will the length be if the width is 7 inches?

b. A can of vegetables costs 19¢ for a 30 oz. can. At the same rate, what will a 45 oz. can cost?

III. 1. Define what we mean by a per cent and give an example.

2. Write 16% as a ratio.

3. Change 18% to a decimal.

4. Change 24% to a fraction in lowest terms.

5. Change $\frac{4}{5}$ to a %.

6. Change .04 to a %.

7. a. Fine 19% of 42.
   b. What % of 60 is 40?
   c. 5% of what number is 18?

8. Use the formula rb=p to solve the following:

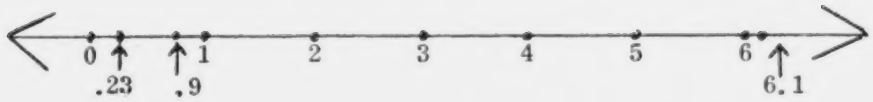
   a. 16% x b = 64 b. 42% x 90 = p

9. Solve the following problems.

   a. If it rained 30% of the days in April, how many days did it rain?
   b. To buy a TV set costing $500, you need a 25% down payment. How much money is needed for the down payment?
   c. Find the interest on $600 if the rate of interest is 8% and you are borrowing the money from the bank for two years.

KEY

I. 1.



2. a. Three tenths
   b. Two hundredths
   c. Five and twenty-three hundredths
   d. Twenty-seven and one thousandth

3. a. .03
   b. 5.9
   c. 6.0008

4. a. $6\left(\frac{1}{10}\right) + 7\left(\frac{1}{100}\right)$

   b. $3(1) + 2\left(\frac{1}{10}\right) + 1\left(\frac{1}{100}\right)$

   c. $5(10) + 8(1) + 3\left(\frac{1}{10}\right) + 4\left(\frac{1}{100}\right)$

5.

a.	34.61	e.	85.366	i.	40
b.	105.343	f.	.368	j.	1500
c.	5.26	g.	.2881	k.	.005
d.	2.414	h.	101528	l.	.875

6. a. .4 b. .075 c. $.\overline{285714}$

7. a. $\frac{7}{10}$ b. $\frac{64}{100} = \frac{16}{25}$ c. $2\frac{6}{25}$ or $\frac{56}{25}$

8. a. R b. T c. R d. T

II. 1. A ratio is a comparison between two numbers - $\frac{2}{3}$.

2. a. $\neq$ b. $\neq$ c. $=$

3. A proportion is a statement of equality between two ratios.

4. a. $C = \frac{27}{4}$ b. $B = \frac{16}{7}$

5. a. $\frac{3}{5} = \frac{7}{n}$ $3n = 35$
$n = 11\frac{2}{3}$ inches

b. $\frac{19}{30} = \frac{n}{45}$ $30n = 855$
$n = 28\frac{1}{2}¢$ or $29¢$

III. 1. Per cent means "out of one hundred" or over 100 - ex. 7% means $\frac{7}{100}$.

2. $\frac{16}{100}$

3. .18

4. $\frac{6}{25}$

5. 80%

6. 4%

7. a. 7.98 b. $66\frac{2}{3}\%$ c. 360

8. a. b = 400 b. p = 37.80

9. a. 9 days b. $125 downpayment c. $96.00 for two years

BIBLIOGRAPHY

1. Dolciani, Mary; Wooton, William; Beckenbach, Edwin; Chinn, William. Modern School Mathematics, 7. Boston: Houghton Mifflin Company, 1967.

2. Gundlach, B.; Buffie, E.; Denny, R.; Kempf, A. Junior High School Mathematics 7. River Forest, Illinois: Laidlaw Brothers, 1968.

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Multiply: F. $9.2 \times .04$ G. $.67 \times .43$ H. $76.4 \times .0002$

Divide: I. $.04 \overline{)1.6}$ J. $.25 \overline{)375}$ K. $15 \overline{).075}$

L. $8 \overline{)7}$

7. Change to fraction in lowest terms:
   A. .7 B. .64 C. 2.24

8. Change to a decimal:
   A. $\frac{2}{5}$ B. $\frac{3}{40}$ C. $\frac{2}{7}$

8. Tell whether fraction is repeating or terminating:
   A. $\frac{5}{6}$ B. $\frac{7}{8}$ C. $\frac{4}{75}$ D. $\frac{7}{200}$

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8. Use the formula rb=p to solve the following:
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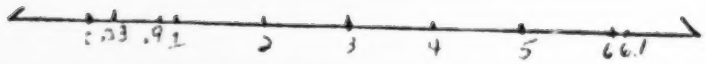

2. A. Three tenths
   B. Two hundredths
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3. A. .03
   B. 5.9
   C. 6.0008

4. A. $6(\frac{1}{10}) + 7(\frac{1}{100})$
   B. $3(1) + 2(\frac{1}{10}) + 1(\frac{1}{100})$
   C. $5(10) + 8(1) + 3(\frac{1}{10}) + 4(\frac{1}{100})$

5. A. 34.61
   B. 105.343
   C. 5.26
   D. 2.414
   E. 85.366
   F. .368
   G. .2881
   H. 101528
   I. 40
   J. 1500
   K. .005
   L. .875

6. A. $\frac{7}{10}$
   B. $\frac{64}{100} = \frac{16}{25}$
   C. $2\frac{6}{25}$ or $\frac{56}{25}$

7. A. .4
   B. .075
   C. $.283714\overline{...}$

8. A. R
   B. T
   C. R
   D. T

II. 1. A ratio is a comparison between two numbers - ~~1/3.~~

2. A. ≠ B. ≠ C. =

3. A proportion is ~~two equivalent~~ ratios.

4. A. C = $\frac{27}{4}$ B. B = $\frac{16}{7}$

5. A. $\frac{3}{5} = \frac{7}{N}$ $3n = 35$ $n = 11\frac{2}{3}$ inches

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Add: A. 6.2
9.45
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B. 2.1 + .003 + 96 + 7.24

Subtract: C. 6.24
- .98

D. 3.4
- .986

E. From 92.1 take 6.734.